forceps as they emerge from the nest, or caught with the net and then pinned. Refractory colonies may be easily quelled by pouring in ether or chloroform, or burning sulphur at the aperture, as is the best method of procedure with wasp's nests.

The solitary species, besides boring in the earth like Andrena and Halictus, whose habits have been described in the first volume of the NATURALIST, also bore in the stems of different plants, such as the elder, syringa, raspberry, and blackberry. Nearly fifty species of insects, mostly hymenoptera, are known in France to burrow in the stems of the blackberry alone! Now is the time to look for their burrows in the dead branches. Their presence is usually detected by an old hole at the end of a broken branch. The writer would be greatly obliged for material to aid him in the study of our bees and wasps, and would take pleasure in corresponding with those interested in the study of their habits, and would be very grateful for specimens of the young in alcohol, their parasites and nests.

REVIEWS.

VOLCANIC ROCKS.*—The author of this interesting memoir classifies volcanic rocks in five orders. The first order consists of Rhyolite with three families, Nevadite or granitic-rhyolite, Liparite or porphyritic-rhyolite, and Rhyolite proper or Lithodic and Hyaline-rhyolite. The second is Trachyte with two families, Samidin-trachyte and Oligoclase-trachyte. The third is Propylite with three families, Quartzose-propylite, Hornblendic-propylite, and Augitic-propylite. The fourth is Andesite with two families, Hornblendic-andesite, and Augitic-andesite. The fifth order is Basalt with three families, Dolerite, Basalt, and Leucitophyte.

The author confines himself in this classification to volcanic rocks of Tertiary and Post-tertiary age, which he subdivides into "massive eruptions" and "volcanic eruptions." The origin of massive eruptions is

* Principles of the Natural System of Volcanic Rocks. By F. Baron Richtofen, Dr. Phil. Memoirs presented to the California Academy of Science, Vol. I, Part 2. May 6, 1867. pp. 4, 94.

attributed to a time when the crust of the earth was thinner than at present, and opened in wide cracks, letting out vast masses of rock in a state of aqueous fusion. These are supposed to have choked up the cracks, and in the gradual consolidation which followed, only local lakes of matter were left in a state of fusion, which find their outlets in the existing volcanoes.

Both in massive and volcanic eruptions the Propylitic rocks are the first or earliest ejected, then in successive, though not invariable, sequence, the Andesitic, Trachytic, Rhyolitic, and Basaltic lavas. Active volcanoes are divided into two classes, those which still continue to eject the same material as exists at their bases in the ancient "massive eruptions," from which the author supposes they take their rise, and those grander rents which have undergone periodical changes in the nature of the ejected rocks.

Lassen's Peak in Northern California belongs to the latter class. The base is Andersitic tufa and ashes, in stratified layers nearly four thousand feet thick, and upon this currents of Andesitic lava, then trachytic lava streams succeed in elongated, sloping tables; rhyolite composes the present summit to the depth of fifteen hundred feet; and, lastly, locally separated, are inferior rents to the north which have thrown out basalt of apparently very recent origin.

Thus the periodical changes, taking place in such larger active volcanoes, correspond in the order of their succession with those exhibited by the older and more massive eruptions.

Active volcanoes may, therefore, be classified as belonging to the propylitic, andesitic, trachytic, rhyolitic, or basaltic epochs, or as arising in one of these and passing through several successive stages of development.

Thus Lassen's Peak has reproduced, during its successive changes, the structural features of existing Andesitic, trachytic, rhyolitic, and basaltic volcanoes, and also the order of succession which is observed in the massive eruptions of former periods. The author, however, candidly admits, that, in some instances, the order of succession is partially reversed, as in the island of St. Paul in the Indian Ocean, where the rhyolitic rocks are overlaid by basalt, and this again by rhyolitic and basaltic rocks in succession.

Following upon this is an highly interesting discussion of the chemical composition, correlations of age and texture, correlations of age and composition, the geographical distribution, and the origin of volcanic rocks.

The extrusion of the lava is accounted for by the expansion which was consequent upon the changes of the denser rocks around the lower part of the cracks or orifices, from a solid or highly viscous state, to one of aqueous fusion.

Granite and Syenite are regarded as the product of very ancient massive eruptions, and as of wholly volcanic origin.

Though these views are so entirely novel, and even startling, and opposed in respect to the origin of granite to the results obtained by the Canadian Survey among the vast masses of granite in Canada West, it is nevertheless a philosophical essay which commands our respect from its solidity, and the evident familiarity and experience of the author with his subject. Whether the principles laid down are true or not in the general application for them claimed, this essay has unquestionably opened a new path to geological investigations.

THE VOLCANOES OF THE HAWAIIAN ISLANDS.*—This work is filled with numerous observations, many of great value, made by the author during his travels among these islands. The whole group is treated one by one in detail.

From Mr. Coan, and others resident among the Sandwich Islands, the author gathered many interesting facts with regard to the various eruptions of the volcanoes of Hawaii, and the physical geography of other members of the group.

The maps of the Kauai and main groups are original, and the crater of Kilauea, on the scale of one-half mile to the inch, is from an actual survey by Mr. Brigham, and of great value to future explorers.

One fact of general interest is, that while the Hawaiian lines of volcanoes run east and west, the major axis of their oval craters are invariably north and south, and, by comparison with the craters of eighteen other lines of volcanoes, it is found that they are generally at right angles with the axes of elevation of the different mountain chains to which they belong.

Mr. Brigham adheres to the mechanical theory of the origin of volcanoes,—"the earth's crust contracts unequally owing to its various composition, structure, and form, causing certain portions to fall below the general level, opening rents at the boundaries, and forcing up molten matter to the surface.

THE GEOLOGY OF IOWA.†—This survey, conducted by Dr. C. A. White, and his assistant, Mr. O. H. St. John, has extended over the counties to the south-west of the Des Moines River, and resulted in the discovery of two series of the Carboniferous rocks. The upper series of beds lie to the south-west of this river, attaining a maximum thickness of one hundred and seventy-five feet. A coal-bed, twenty inches in thickness, was traced along the valley of the Nodaways through the counties of Adams, Taylor, and Page. The upper series, comprising nearly all the workable coal-beds in the State, is found to the north-east of the Des Moines River. The inclination of the strata is south-west, and therefore Dr. White argues that miners in the south-western counties may expect to find pro-

* Notes on the Volcanoes of the Hawaiian Islands, with a History of their various Eruptions. By W. T. Brigham, A. M. Memoirs of the Boston Society of Natural History. Vol. I, Part 3, pp. 132, with five plates.

† First and Second Annual Report of Progress. By the State Geologist and the Assistant and Chemist on the Geological Survey of the State of Iowa. 8vo, 284 pp. Des Moines, 1868.